

PLANT BREEDING AND PLANT SELECTION WITH TRANSGENES. Thomas J. Peters, Monsanto Company, Chesterfield, MO 63017.

Genetic modification or genetic engineering involves the transfer of genes from one organism to another. Gene transfers from plants of the same species or closely related species has occurred throughout the course of plant evolution and are the basis for the crop improvement. Gene transfers between very different organisms has provided scientists the opportunity to genetically transform plants and create plants with tolerance to herbicides, protection from insects and to potentially modify plant yield or seed composition.

*Agrobacterium*-mediated plant transformation is one of several methods to incorporate desirable traits into plants. DNA carrying the desired gene or trait is inserted into the tumor-inducing plasmid of the bacterium and is transferred to the cell nucleus and integrated into the chromosome following infection. All cells carry the new gene or trait when a plant is regenerated from a single cell following regeneration.

Plant Breeders evaluate plants derived from transformation to identify plants with the best combination of molecular characterization, expression/efficacy and agronomic evaluation. Transgenes usually are single dominant genes that follow Mendelian segregation ratios. That is, a 3:1 ratio (phenotype) in the self-pollination generation and a 1:1 ratio in the backcrossing generation. Efficacy is the phenotypic expression of the gene of interest and can be influenced by copy number, intactness of the insert and position in the genome. Agronomic experiments are conducted to ensure that the transgene does not have a deleterious affect when evaluated in a trait neutral environment compared to its non-transformed parent or gene negative isolate.